RA3.7 *Field Verification and Diagnostic Testing of Mechanical Ventilation Systems*

RA3.7.1 Purpose and Scope

RA3.7 contains procedures for measuring the airflow in mechanical ventilation systems to confirm compliance with the requirements of ASHRAE 62.2.

RA3.7 is applicable to mechanical ventilation systems in low-rise residential buildings.

RA3.7 provides required procedures for installers, HERS raters and others who are required to perform field verification of mechanical ventilation systems for compliance with Part 6.

Table RA3.7-1 – Summary of Verification and Diagnostic procedures

Diagnostic	Description	Procedure
Whole-Building Mechanical Ventilation Airflow – Continuous Operation	Verify that whole-building ventilation system complies with the airflow rate required by ASHRAE Standard 62.2.	RA7.4.1 Continuous Operation
Whole-Building Mechanical Ventilation Airflow – Intermittent Operation	Verify that whole-building ventilation system complies with the airflow rate required by ASHRAE Standard 62.2.	RA7.4.2.Intermittent Operation

RA3.7.2 Instrumentation Specifications

The instrumentation for the air distribution diagnostic measurements shall conform to the following specifications:

RA3.7.2.1 ***Pressure Measurements***

All pressure measurements shall be measured with measurement systems (i.e., sensor plus data acquisition system) having an accuracy equal to or better than ± 1% of pressure reading or ± 0.2 Pa (0.0008 inches water) (whichever is greater). All pressure measurements within the duct system shall be made with static pressure probes such as Dwyer A303 or equivalent.

RA3.7.2.2 ***Airflow Rate Measurements***

All measurements of ventilation fan airflow rate shall be made with an airflow rate measurement apparatus (i.e., sensor plus data acquisition system) having an accuracy equal to or better than ± 10% of reading. The apparatus shall have an accuracy specification that is applicable to the airflow rates that must be verified utilizing the procedures in Section RA3.7.4.

RA3.7.2.3 ***Calibration***

All instrumentation used for mechanical ventilation system airflow rate diagnostic measurements shall be calibrated according to the manufacturer's calibration procedure to ensure the airflow measurement apparatus conforms to the accuracy requirement specified in Section RA3.7.2.2.

RA3.7.3 Diagnostic Apparatus for Measurement of Ventilation System Airflow

Ventilation system airflow rate shall be measured using one of the apparatuses listed in Section RA3.7.3. The apparatus shall produce airflow rate measurements that conform to the accuracy requirements specified in Section RA3.7.2 for measurements of residential mechanical ventilation system airflow at system grilles or registers for single or multiple branch ventilation duct systems.

The airflow rate measurement apparatus manufacturers shall publish in their product documentation, specifications for how their airflow measurement apparatuses are to be used for accurately measuring residential mechanical ventilation system airflow at system grilles or registers of single or multiple branch ventilation systems.

The airflow measurement apparatus manufacturers shall certify to the Energy Commission that use of the apparatus in accordance with the specifications given in the manufacturer's product documentation will produce measurement results that are within the accuracy required by Section RA3.7.2.2.

For the airflow measurement apparatuses that are certified to the Commission as meeting the accuracy required by Section RA3.7.2.2, the following information will be posted on the Energy Commission website, making the information available to all people involved in the airflow verification compliance process:

(a) The product manufacturers' model numbers for the airflow measurement apparatuses.

(b) The product manufacturers' product documentation that gives the specifications for use of the airflow measurement apparatuses to accurately measure residential mechanical ventilation system airflow at system grilles or registers of single or multiple branch ventilation systems.

A manufacturer's certification to the Commission of the accuracy of the airflow measurement apparatus, and submittal to the Commission of the product documentation that specifies the proper use of the airflow measurement apparatus to produce accurate airflow rate measurements shall be prerequisites for allowing the manufacturer's airflow measurement apparatus to be used for conducting the system airflow verification procedures in Section RA3.7 for demonstrating compliance with Part 6.

RA3.7.3.1 ***Residential Mechanical Exhaust Airflow Measurement Device***

A flowmeter that meets the applicable instrument accuracy specifications in RA3.7.2 shall be used to measure the mechanical exhaust airflow.

RA3.7.3.2 ***Powered Flow Capture Hood Airflow Measurement Device***

A powered and pressure balanced flow capture hood (subsequently referred to as a Powered Flow Hood[3]) that has the capability to balance the flow capture static pressure difference between the room and the flow capture hood enclosure to 0.0 ± 0.2 Pa (0.0008 inches water) and meets the applicable instrumentation specifications in Section RA3.7.2 may be used to verify the ventilation airflow rate if the powered flow hood has a flow capture area at least as large as the ventilation system register/grille in all dimensions. The fan adjustment needed to balance the flow capture static pressure difference between the room and the flow capture hood enclosure to 0.0 ± 0.2 Pa (0.0008 inches water) shall be provided by either an automatic control or a manual control operated in accordance with the apparatus manufacturer's instructions specified in the manufacturer's product documentation.

RA3.7.3.3 ***Traditional Flow Capture Hood***

A traditional flow capture hood[4] meeting the applicable instrumentation specifications in Section RA3.7.2 may be used to verify the ventilation system airflow rate if the non-powered flow hood has a capture area at least as large as the ventilation system register/grille in all dimensions.

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3 Also known as "active" flow hood, or "fan assisted" flow hood.

4 Also known as “non-powered flow hood, "standard" flow hood, "commercially available" flow hood, or "passive" flow hood

RA3.7.4 Procedures

This section describes the procedures used to verify Mechanical ventilation system airflow.

RA3.7.4.1 *Whole-Building Mechanical Ventilation Airflow Rate Measurement - Continuous Operation*

RA3.7.4.1.1 **Exhaust Ventilation Systems**

A flow measuring device that meets the applicable instrumentation requirements of Section RA3.7.2 shall be used. If the measured airflow is equal to or greater than the value for whole-building ventilation airflow rate required by Section 4 of ASHRAE Standard 62.2, the mechanical ventilation system complies with the requirement for whole-building mechanical ventilation airflow. If the measured airflow is less than the required whole-building ventilation airflow rate, the mechanical ventilation system does not comply, and corrective action shall be taken.

RA3.7.4.1.2 **Supply Ventilation Systems**

The Executive Director may approve supply mechanical ventilation systems, devices, or controls for use for compliance with the HERS Rater field verification and diagnostic testing requirement for whole-building mechanical ventilation airflow, subject to a manufacturer providing sufficient evidence to the Executive Director that the installed mechanical ventilation systems, devices, or controls will provide at least the minimum whole-building ventilation airflow required by ASHRAE Standard 62.2, and subject to consideration of the manufacturer's proposed field verification and diagnostic test protocol for these ventilation system(s).

Approved systems, devices, or controls, and field verification and diagnostic test protocols for Supply Ventilation Systems shall be listed in directories published by the Energy Commission.

RA3.7.4.2 *Whole-Building Mechanical Ventilation Airflow Rate Measurement - Intermittent Operation*

The Executive Director may approve intermittent mechanical ventilation systems, devices, or controls for use for compliance with the HERS Rater field verification and diagnostic testing requirement whole-building mechanical ventilation airflow, subject to a manufacturer providing sufficient evidence to the Executive Director that the installed mechanical ventilation systems, devices, or controls will provide at least the minimum whole-building ventilation airflow required by ASHRAE Standard 62.2, and subject to consideration of the manufacturer's proposed field verification and diagnostic test protocol for the ventilation system(s).

Approved systems, devices, or controls, and field verification and diagnostic test protocols for intermittent mechanical ventilation systems shall be listed in directories published by the Energy Commission.